

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	File Nos. _____
Request of Progeny LMS, LLC)	
)	WT Docket No. 12-202
For Modification of A Block Licenses)	

**PETITION FOR MODIFICATION
OF A BLOCK M-LMS LICENSES**

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SUMMARY

Pursuant to Section 316 of the Communications Act, the Commission should modify the two A block Multilateration Location and Monitoring Service (“M-LMS”) licenses that are held by Progeny LMS, LLC (“Progeny”) in the Minneapolis and Sacramento Economic Areas (“EAs”) to convert them into C block licenses. Such action would promote the public interest, convenience and necessity for several reasons.

Progeny designed its M-LMS network to provide highly accurate indoor location capabilities to support wireless calls to E911 emergency services. The modification of Progeny’s A block licenses into C block licenses would harmonize Progeny’s M-LMS spectrum throughout the country. This could reduce the time-to-first-fix for wireless handsets operating from a cold start with Progeny’s location service. Such harmonization would also reduce the cost and complexity of wireless handsets designed to operate with Progeny’s indoor location service. In addition, it would alleviate the administrative necessity of securing Commission approval to operate Progeny’s M-LMS network in Minneapolis and Sacramento using the M-LMS A block.

The modification of Progeny’s two A block licenses into C block licenses would also facilitate spectrum sharing with unlicensed Part 15 devices, which are disproportionately designed to operate in the A block portion of the 902-928 MHz band as compared to the C block portion. The modification of Progeny’s two A block licenses into C block licenses would also promote the public interest by resulting in a net benefit of more than 1.5 million MHz/pops to the Commission’s unassigned spectrum inventory. Finally, the modification of Progeny’s two A block licenses into C block licenses would be consistent with recent Commission precedent involving the modification of spectrum held by other licensees in order to harmonize their spectrum holdings throughout their licensed coverage areas.

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Progeny LMS, LLC (“Progeny”), by its attorneys and pursuant to Section 316 of the Communications Act, hereby requests that the Commission modify two of its 900 MHz Multilateration Location and Monitoring Service (“M-LMS”) Economic Area (“EA”) licenses to convert them from A block licenses into C block licenses. Progeny holds 228 M-LMS licenses, including 113 B block licenses, 113 C block licenses and 2 A block licenses. The two A block licenses, call signs WPQQ203 and WPQQ254, authorize the use of 6 MHz of M-LMS spectrum in Minneapolis and Sacramento.¹

Progeny requests that its two A block licenses be converted into C block licenses in order to harmonize Progeny’s spectrum holdings throughout the country. Such harmonization will help facilitate Progeny’s use of its M-LMS spectrum to provide highly accurate indoor location services to support E911 emergency first responders. Such harmonize will also potentially

¹ On January 17, 2017, the Commission issued an order that effectively terminated Progeny’s two A block licenses. *See* Request of Progeny LMS, LLC for Waiver and Limited Extension of Time, WT Docket No. 12-202, *Order*, DA 17-20, ¶ 36 (Jan. 17, 2017) (“*Waiver Order*”). On February 16, 2017, Progeny timely filed a petition for reconsideration of the relevant portion of the *Waiver Order*, which remains pending. *See* Petition for Reconsideration of Progeny LMS, LLC, File Nos. 0006729503 *et al.*, WT Docket No. 12-202 (Feb. 16, 2017).

benefit users of unlicensed Part 15 devices, which disproportionately operate in the mid and lower portions of the 900 MHz band. In addition, such harmonization would result in a net benefit of more than 1.5 million MHz/pops to the Commission's unassigned spectrum inventory.

Section 316 of the Communications Act authorizes the Commission to modify any station license if "in the judgment of the Commission such action will promote the public interest, convenience, and necessity."² The modification of Progeny's A block licenses into C block licenses will clearly promote the public interest, convenience and necessity. Consistent with the Act and the Commission's rules, Progeny hereby waives the requirement that it receive written notification and an opportunity to protest the proposed action.³

² 47 U.S.C. § 316.

³ See 47 C.F.R. § 1.87. In seeking the modification of Progeny's A block licenses into C block licenses in Minneapolis and Sacramento, Progeny acknowledges that the C block M-LMS spectrum for these two cities is in the Commission's unassigned spectrum inventory as a result of the recent cancellation of C block M-LMS license call sign WPYE291, which was held by PCS Partners, L.P., and C block M-LMS license call sign WQGN602, which was held by Telesaurus GB, LLC. See PCS Partners, L.P., Petition for Waiver of 47 C.F.R. § 90.353(b) and Request for Extension of Time and for Expedited Treatment, WT Docket No. 16-149, *Order*, DA 17-1125 (Mobility Div., Nov 20, 2017); Helen Wong-Armijo, Applications for Waiver and Limited Extension of Time; FCR, Inc., Applications for Waiver and Limited Extension of Time; Skybridge Spectrum Foundation, Telesaurus Holdings GB, LLC, Applications for Waiver and Limited Extension, WT Docket No. 16-385, *Order*, DA 17-1124 (Mobility Div., Nov. 20, 2017). Both of these Bureau decisions may be subject to further proceedings before the Commission on reconsideration and/or review and thereafter before the judiciary. Progeny would accept the modification of its A block licenses into C block licenses conditioned on the outcome of these further proceedings.

I. THE GRANT OF A MODIFICATION WILL PROMOTE THE PUBLIC INTEREST BY FACILITATING PROGENY'S PROVISION OF ITS HIGHLY ACCURATE INDOOR LOCATION SERVICE TO SUPPORT EMERGENCY FIRST RESPONDERS

Progeny's M-LMS beacon system was designed to solve the longstanding problem of inadequate location capabilities for wireless E911.⁴ The Commission has repeatedly affirmed that improved indoor wireless location accuracy is a critical public safety need.⁵ The steadily expanding prevalence of wireless phones "increases the likelihood that wireless 911 calls will come from indoor environments where traditional location accuracy technologies optimized for outdoor calling often do not work effectively or at all."⁶ As a result, the limitations of current indoor location accuracy have become increasingly evident.⁷ The Commission has unequivocally concluded that "[t]his gap in the performance of 911 location service needs to be closed: the public rightfully expects 911 location technologies to work effectively regardless of whether a 911 call originates indoors or outdoors."⁸

⁴ See, e.g., Letter from Bruce A. Olcott, Counsel, Progeny LMS, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, PS Docket No. 07-114 & WT Docket No. 11-49, at Attachment 1, slide 2 (June 10, 2012).

⁵ Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114, *Third Report and Order, and Second Further Notice of Proposed Rulemaking*, 26 FCC Rcd 10074 (2011) (noting that effective E911 operation "requires development of indoor technical solutions").

⁶ Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114, *Fourth Report and Order*, FCC 15-9, ¶ 2 (2015) ("*Location Accuracy Order*"); Wireless E911 Location Accuracy Requirements, WT Docket No. 07-114, *Further Notice of Proposed Rulemaking*, FCC 14-13, ¶¶ 22, 28 (Feb. 21, 2014) ("*Location Accuracy Further Notice*").

⁷ *Location Accuracy Further Notice*, ¶ 31 (noting that "indoor locations pose particular challenges for first responders in finding the caller" because "indoor incidents are often not visible to the first responder, and a city block in an urban environment could potentially contain thousands of apartments").

⁸ *Location Accuracy Order*, ¶ 2.

The development of Progeny’s location technology has proceeded in parallel with and in response to the Commission’s desire for accurate, rapid, and reliable location capabilities in “challenging indoor environments” such as deep inside large and multistory buildings.⁹ The Commission explicitly acknowledged Progeny’s value in “improve[ing] delivery of E911 emergency services.”¹⁰ Progeny has undertaken significant effort and expense to ensure that its M-LMS network will be capable of meeting the Commission’s E911 needs, including working closely with major wireless carriers and the Communications Security, Reliability, and Interoperability Council (“CSRIC”) to facilitate benchmark testing, and improving the accuracy of its M-LMS network to meet or exceed the Commission’s accuracy benchmarks.¹¹ Progeny has already installed initial beacons in the country’s major cities and has repeatedly expressed its capability and willingness to expand its coverage based on guidance from wireless carrier that may wish to use its network.¹²

From a technical standpoint, Progeny’s indoor location technology can operate in any portion of the 902-928 MHz band. Consistent with this, Progeny worked with the wireless industry within the framework of the 3rd Generation Partnership Project (“3GPP”) to develop and adopt standards for Progeny’s Terrestrial Beacon System (“TBS”) technology that allow for

⁹ *Id.*, ¶ 19 n.36 (noting research that acknowledges that “GPS does not perform well in urban canyons, close to walls, buildings, trees, indoors, and in underground environments”).

¹⁰ *M-LMS Waiver Order*, ¶ 29.

¹¹ See Letter from Bruce A. Olcott, Counsel for NextNav, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, PS Docket No. 07-114 (Aug. 14, 2013) (providing a report on the independent test results of NextNav’s Rev-2 location technology improvements).

¹² See, e.g. Reply Comments of NextNav, LLC, PS Docket No. 07-114, at 23 (July 14, 2014); Comments of NextNav, PS Docket No. 07-114, at 10 (May 12, 2014).

its deployment in any frequency band.¹³ Nevertheless, the harmonization of Progeny’s M-LMS frequency assignments across all major metropolitan areas could enhance the quality of Progeny’s highly accurate indoor location service and facilitate its rapid and efficient deployment in every major community where it is needed.

A. The Grant of a Modification will Potentially Enable a Faster Time-to-First-Fix for Wireless Handsets Supported by Progeny’s Indoor Location Service

As highlighted by the most recent report of CSRIC V, the Commission should continue to support the development of new location technologies that not only promise significantly increased accuracy, but also increased speed.¹⁴ Location technologies that can identify the precise location of a wireless caller more rapidly are highly beneficial for several reasons. Most obvious, the rapid identification of the location of a wireless caller hastens the dispatch of first responders to the location of an emergency. In addition, the Commission is currently exploring whether rapidly available location information could be used to ensure the correct routing of wireless calls to the appropriate public safety answering point (“PSAP”), thus avoiding the significant delays that can result from misrouted wireless calls to E911 and the burdensome process of transferring those calls to the correct PSAP once it has been identified.¹⁵

¹³ The open standards for Progeny’s TBS technology are publicly available on the ATIS website. *See* www.atis.org.

¹⁴ Communications Security, Reliability and Interoperability Council V, Working Group 1, *Evolving 911 Services, Final Report – Task 2: 911 Location-Based Routing* (Sep. 2016), available at https://tr2_FinalReport_092016.docx.

¹⁵ *See* Location-Based Routing For Wireless 911 Calls, PS Docket No. 18-64, *Notice of Inquiry*, FCC 18-32, ¶ 2 n.4 (March 23, 2018) (“*Call Routing NOP*”) (providing examples of misrouted E911 calls and the sometimes tragic consequences of their occurrence).

Progeny has worked extensively to maximize both the accuracy and the speed of its indoor location service. As the Commission has acknowledged, one of the challenges for location technologies is rapidly identifying location information from a cold start, *i.e.*, when neither the wireless network nor the wireless handset have any pre-existing data regarding the location of the device.¹⁶ With respect to Progeny's location service, the first step in a cold start is for the wireless handset to detect multiple beacon signals from Progeny's location network (just as the first step for a wireless device using A-GPS is the detection of signals from multiple GPS satellites).

If Progeny's location service is harmonized nationwide for the upper portion of the 902-928 MHz band (*i.e.*, the M-LMS B and C blocks), all handsets employing Progeny's service will be able to expedite the beacon detection process by "listening" for signals only in that portion of the frequency band. If Progeny's service additionally employs A block spectrum in certain major cities, however, then the handsets may need to be programmed to "listen" for the beacon signals in the A block if the signals are not promptly detected in the upper portion of the frequency band. This additional listening process could increase the time-to-first-fix ("TTFF") from a cold start for Progeny's service in cities where the A block is employed.¹⁷ The additional listening process could also conceivably increase the TTFF from a cold start in cities where the B and C blocks are employed if a handset does not initially detect the beacon signals that are present in the B and C blocks and begins to listen for signals in the A block.

¹⁶ *Call Routing NOI*, ¶ 25.

¹⁷ In situations in which a wireless handset is determining its location information from a warm start, the handset will already have determined whether Progeny's beacon network is using the A block or the B and C blocks in the community where the handset is located, thus normally avoiding any delay in its TTFF.

The harmonization of Progeny's M-LMS spectrum across all major cities would avoid these potential delays and ensure that Progeny's location service provides the most rapid TTFF possible in every community where it is employed to assist emergency first responders.

B. The Grant of a Modification will Reduce the Cost and Complexity of Wireless Handsets Supported by Progeny's Indoor Location Service

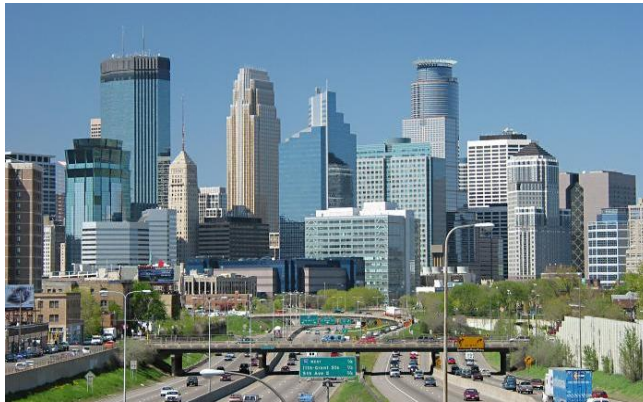
The harmonization of Progeny's spectrum in the upper portion of the 902-928 MHz band would also reduce the complexity and cost of wireless handsets that are supported by Progeny's indoor location service. Handset receivers that are designed to support all three M-LMS frequency blocks will require a tuner and a front end SAW filter with a wider bandwidth and range, which could result in signal isolation issues, such as isolation from 800 MHz wireless services operating below 894 MHz, which are much closer to the A block than the B or C blocks.

The design of wireless handsets to support all three frequency blocks could also modestly increase the power consumption of the device because of the additional time that may be required for handset receivers to "listen" for Progeny's beacon signals in the A block if the beacon signals are not promptly detected in the B and C blocks. Given these factors, it would reduce the complexity and cost of wireless handsets that are supported by Progeny's indoor location service to harmonize Progeny's frequencies in all major communities when Progeny's service may be used to support emergency first responders.

C. The Grant of a Modification will Reduce the Administrative Burden of Launching Progeny's Indoor Location Service in Minneapolis and Sacramento

The harmonization of Progeny's spectrum in the upper portion of the 902-928 MHz band would also reduce the administrative burden of launching Progeny's location service in Minneapolis and Sacramento. These two cities are both in the top 25 CMAs, Minneapolis being

number 16 and Sacramento being number 24. As shown below, they both include urban centers with tall buildings, environments in which Progeny's indoor location technology excels.



Minneapolis, Minnesota



Sacramento, California

Progeny, however, has not yet secured Commission approval to provide commercial service in Minneapolis and Sacramento using M-LMS spectrum in the A block. Thus, Progeny still needs to complete this process. This said, the administrative steps to demonstrate compliance should be minimal.

The operational characteristics of Progeny's one-way beacon service are identical in the A block as compared to the B and C blocks. So too are the operational characteristics of the Part 15 devices that operate in the A block versus the B and C block portions of the 902-928 MHz band. Therefore, Progeny should be able to rely on the results of its previous field tests with Part 15 devices to demonstrate that its location service will not cause unacceptable levels of interference to unlicensed devices. However modest, the removal of this administrative prerequisite to Progeny's provision of location services in Minneapolis and Sacramento would be beneficial with respect to the conservation of the Commission's resources, those of Progeny, and the Part 15 community. Therefore, the modification of Progeny's two A block licenses into C block licenses would serve the public interest by facilitating the deployment of Progeny's critically important location service in Minneapolis and Sacramento.

II. THE GRANT OF A MODIFICATION WILL FACILITATE SPECTRUM SHARING WITH PART 15 DEVICES IN MINNEAPOLIS AND SACRAMENTO

Progeny's M-LMS service is authorized to operate on a shared basis with secondary Part 15 devices in the 902-928 MHz band. Progeny conducted extensive field testing to demonstrate that its M-LMS network would not result in unacceptable levels of interference to Part 15 devices. Based on this demonstration, the Commission authorized Progeny to commence commercial operations.¹⁸ The Commission also urged Progeny "to take reasonable steps to minimize, avoid, or remedy interference . . . at locations where a significant number of unlicensed users are affected."¹⁹

According to the Commission's equipment certification database, an increasingly large percentage of Part 15 devices are certified to operate in the A block portion of the 902-928 MHz band (*i.e.*, 904-909.75 MHz) as compared to the C block portion of the 902-928 MHz band (*i.e.*, 921.75-927.25 MHz). Even when adjusted for the 250 KHz difference in bandwidth, significantly more Part 15 devices have been developed that are capable of operating in the A block as compared to the C block, and this preference toward the A block has been steadily increasing for decades. As shown in the table below, just in the past two years, the number of Part 15 devices that were certified for operations in the A block was more than 20 percent greater than the number of Part 15 devices that were certified for operations in the C block.

¹⁸ Request by Progeny LMS, LLC for Waiver of Certain Multilateration Location and Monitoring Service Rules; Progeny LMS, LLC Demonstration of Compliance with Section 90.353(d) of the Commission's Rules, FCC 13-78, *Order*, WT Docket No. 11-49 (June 6, 2013).

¹⁹ *Id.*, ¶ 31.

Frequency Block	Prior to 2018	2000-2017	2010-2017	2015-2017
M-LMS A block (904-909.75 MHz)	8418	6406	3625	1506
M-LMS C block (921.75-927.25 MHz)	7611	5531	3018	1170
C block <i>plus</i> 250 KHz (921.75-927.5 MHz)	7618	5538	3019	1170
Percentage Greater	9.5%	13.5%	16.7%	22.3%

Number of Part 15 Device Models Certified in Each Spectrum Block

Obviously, this data cannot be extrapolated to estimate how many Part 15 devices are actually operating in either the A block or the C block. Nevertheless, it is reasonable to conclude that the larger number of Part 15 equipment certifications covering the A block, and the increasing trend toward their use of the A block, indicates that the overall density of unlicensed devices operating in the A block is greater than in the C block. The reason for the greater density of unlicensed devices in the lower portions of the 902-928 MHz band is likely because Part 15 device manufacturers may be trying to avoid interference from paging services operating above 928 MHz. In any event, because of the greater density of Part 15 devices in the lower portion of the band, it would clearly facilitate spectrum sharing between Progeny's M-LMS service and unlicensed Part 15 devices for the Commission to exercise its authority under Section 316 of the Act to modify Progeny's two A block licenses into C block licenses.

III. THE GRANT OF A MODIFICATION WILL RESULT IN A NET BENEFIT TO THE COMMISSION'S UNASSIGNED SPECTRUM INVENTORY

In seeking to modify Progeny's two A block licenses into C block licenses, Progeny acknowledges that its A block licenses authorize the use of 6 MHz of spectrum in each of Minneapolis and Sacramento, while C block licenses authorize the use of only 5.75 MHz of spectrum. The modification of Progeny's two A block licenses into C block licenses will

therefore result in a net benefit to the Commission's unassigned spectrum inventory of 250 KHz in the Minneapolis and Sacramento EAs, a benefit in MHz/pop of more than 1.5 million.²⁰ As discussed in the following section of this petition, the Commission has concluded in a similar case that a modification that increases the Commission's unassigned spectrum inventory provides a benefit to the public interest and further justifies the grant of a modification pursuant to Section 316 of the Communications Act.²¹

IV. THE GRANT OF A MODIFICATION WOULD BE CONSISTENT WITH RECENT COMMISSION PRECEDENT

Finally, the modification of Progeny's two A block M-LMS licenses into C block licenses would be consistent with Commission precedent. For example, in 2016, the Commission twice concluded that the public interest, convenience and necessity would be served by the modification of licenses in the 218-219 MHz Service in order to harmonize the spectrum holdings of several major transit authorities to facilitate their implementation of Positive Train Control ("PTC") in the New York metropolitan area.²² In each instance, the relevant licensees had secured authority to operate in different portions of the 218-219 MHz band in different counties. To facilitate the operation of their PTC networks, the Commission used its unassigned

²⁰ Assuming a 2010 population for the Minneapolis EA of 3,390,091 and for the Sacramento EA of 2,722,415 (*i.e.*, a total population of 6,112,506) multiplied by 0.25 (250 KHz) resulting in 1,528,126.5 MHz/pops.

²¹ Metropolitan Transportation Authority, Request for Modification of Station KIVD0002, Application for Renewal of Station KIVD0002, Request for Waiver to Facilitate Positive Train Control System, FCC 16-15, *Proposed Order of Modification and Order on Reconsideration*, File Nos. 0006682035, 0006109691 and 0005681972 (Feb. 16, 2016) ("*MTA Order*").

²² *See id.*; *see also* PTC-220, LLC, Request for Modification of Station KIVD0007 and Waivers to Implement Positive Train Control, DA 16-1406, *Proposed Order of Modification* (Dec. 19, 2016).

spectrum inventory to assign them the same 250 KHz of spectrum throughout their coverage areas and accepted the return of the non-harmonized 250 KHz of spectrum in those counties where it had been authorized.

In both situations, the Commission concluded that such a modification would “promote the vital public interest in rail safety” by enabling the transit agencies to complete their Congressionally mandated PTC networks.²³ The Commission also concluded that the license modifications would be consistent with the Commission’s fundamental obligation to “promot[e] safety of life and property through the use of wire and radio communications....”²⁴

In addition, in one of the two decisions, the Commission observed that the substitution would result in the transit licensee surrendering 250 MHz of spectrum in one more county than where it was receiving spectrum, resulting in a net benefit to the Commission’s unassigned spectrum inventory of 46,951 MHz/pops.²⁵ The Commission concluded that this relatively small increase in its unassigned spectrum inventory (Progeny is proposing to return more than 1.5 million MHz/pops to the Commission) constituted an additional reason why the modification would “uniquely promote the public interest.”²⁶

²³ *MTA Order*, ¶ 3; *see also PTC-220 Order*, ¶ 15.

²⁴ 47 U.S.C. § 151.

²⁵ *See MTA Order*, ¶ 62.

²⁶ *Id.*

In another recent decision, the Commission allowed all licensees in the 39 GHz Service to modify their licenses to create contiguous blocks of spectrum and thereby eliminate fragmentation in the band.²⁷ In justifying this decision, the Commission explained that contiguous bands would be “more usable by incumbents as well as new entrants for the new flexible use service”²⁸ and could avoid the potential inefficiency of holding an auction for spectrum in a fragmented spectrum band.²⁹

Give this precedent, Progeny’s request for the Commission to modify its two A block M-LMS licenses into C block licenses would clearly serve the public interest, convenience and necessity by facilitating the deployment of Progeny’s highly accurate indoor location technology to support the critical needs of emergency first responders in the major metropolitan areas of Minneapolis and Sacramento.

V. CONCLUSION

Pursuant to Section 316 of the Communications Act, the Commission should modify Progeny’s two A block M-LMS licenses in the Minneapolis and Sacramento EAs to convert them into C block M-LMS licenses. Such action would promote the public interest, convenience and necessity by enhancing the quality of Progeny’s highly accurate indoor location service,

²⁷ See Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, *et al.*, GN Docket No. 14-177, *et al.*, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 16-89, ¶ 97 (July 14, 2016).

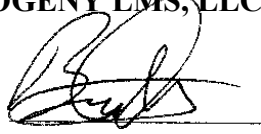
²⁸ *Id.*, ¶ 100.

²⁹ See *id.*, ¶ 97.

facilitating its rapid and cost effective deployment, facilitating spectrum sharing with unlicensed Part 15 devices, and providing a net benefit to the Commission's unassigned spectrum inventory.

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